Claims

1. A process for producing a flat commutator (1) in which a metallic carrier body which forms segment support parts (4; 104)

   - is provided (52; 152) with a hub (6) which is formed from an electrically insulating material,
   - is joined in an electrically conductive manner and mechanically strong to an annular disk (54; 154) which is resistant to a reactive environment,
   - is divided (55;155A) into segment support parts (4; 104),
   - the annular disk is divided (55; 155B) into annular segments (2; 102),
   - the surfaces of the metallic segment support parts exposed by the division of the carrier body are coated with a coating which is resistant to the environment,

   characterized in that

   - coating takes place by currentless deposition.

2. The process as claimed in Claim 1, wherein deposition takes place from a solution or suspension.

3. The process as claimed in Claim 1 or 2, wherein the annular disk (54; 154) contains carbon.

4. The process as claimed in one of Claims 1 to 3, wherein the carrier body

is divided into segment support parts (4; 104) after joining to the annular disk, especially wherein the dividing of the annular disk and the dividing of the carrier body take place in one step, preferably by abrasive cutting or sawing of the combination consisting of the carrier body and the annular disk.

5. The process as claimed in one of Claims 1 to 4, wherein coating takes place selectively only on the surfaces of the segment support parts (4; 104).

6. The process as claimed in one of Claims 1 to 5, wherein coating takes place with tin, silver or chromium.

7. The process as claimed in one of Claims 1 to 6, wherein the layer thickness is between 0.1 and 10 μm.

8. A commutator produced using a process as claimed in one of Claims 1 to 7, wherein the hub (6) in the area of the division adjoins the carrier body.

9. A commutator as claimed in Claim 8, wherein the hub (6) forms a complete covering of a cylindrical boundary surface of a central hole (6a) of the carrier body for holding the shaft of a rotor of a motor or generator.

10. An electric motor for driving a fuel pump with a commutator produced using a process as claimed in one of Claims 1 to 7, wherein the coating

deposited currentlessly and preferably from a solution or suspension is resistant to a fuel obtained from renewable raw materials.

Figure 1

PUNCHING OUT THE CU PLATE 50

↓

SHAPING OF THE CARRIER BODY INTO A POT 51

↓

EXTRUSION OF THE CARRIER BODY WITH FORMATION OF A HUB 52

↓

MACHINING OF THE HUB AND THE CONTACT SURFACE OF THE CARRIER BODY 53

↓

APPLICATION OF THE ANNULAR DISK 54

↓

DIVIDING THE ANNULAR DISK AND THE CARRIER BODY INTO SEGMENTS 55

↓

COATING OF THE SEGMENT SUPPORT PARTS 56

Figure 2

PUNCHING OUT THE CU PLATE 150

↓

SHAPING OF THE CARRIER BODY INTO A POT 151

↓

EXTRUSION OF THE CARRIER BODY WITH FORMATION OF A HUB 152

↓

DIVIDING THE CARRIER BODY INTO SEGMENTS 155A

↓

COATING OF THE SEGMENT SUPPORT PARTS 156

↓

APPLICATION OF THE ANNULAR DISK 154

↓

DIVIDING THE ANNULAR DISK INTO SEGMENTS 155B

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In contrast to this invention, JP 58 075440 A does not show a flat commutator but a drum commutator. Furthermore, this document is directed at the prevention of fuel oxidation ("to prevent the oxidation of gasoline"). To this end, a plate (sheet 8) which is resistant to fuel is connected with the not yet burnished copper plate which forms the carrier body.

FR2 330 169 A also shows a drum commutator (cf. Figures 1 to 3) and hence a nongeneric subject. The layer with reference numbers 11a and 11b depicted in Figure 5 of this document is a layer which is produced by oxidation.

US 5,175,463 shows a flat commutator whose segment support parts are separated by radial slots. A compound with low melting point consisting of different metals is used in the connection of the carbon-containing annular disk with the metallic segment support parts.

DE 29 03 029 C2 constitutes the proximate state of the art and shows among others a process for producing a flat commutator in which a copper plate with a disk-shaped sheet of silver or silver alloy invulnerable to gasoline is applied, then slotted at regular intervals, and finally the denuded copper parts of the commutator bars are covered with a galvanically applied electroplated layer of silver or tin.

Therefore the object of the invention is to devise a process for producing a flat commutator which eliminates the disadvantages of the prior art, which in particular is more economical and which still ensures sufficient resistance of the finished commutator in a reactive environment. In addition, the coating will be relatively thick, especially in undercuts and/or grooves which may be present as a result of dividing the carrier body, will be as uniform as possible and in any case it will be possible to apply the coating to form a cohesive layer. In addition, the invention will make it possible to use electric motors for driving a pump for fuels obtained from renewable raw materials.

The object is achieved by the process defined in Claim 1 and by the commutator and electric motor defined in the subordinate claims. Special embodiments of the invention are defined in the dependent claims.

The surfaces of the metallic segment support parts which are exposed by dividing are covered with a coating which is resistant to a reactive or aggressive environment. The resistance relates especially to protection of the carrier body and/or the segment support parts and the connection to the annular disk against breakdown, relates to electrical conductivity with respect to the contact resistance between the commutator contact surface formed by the annular disk and the pertinent segment support part or between it and the commutator brush, and relates

Claims

Sub B1

1. A process for producing a flat commutator (1) in which a metallic carrier body which forms segment support parts (4; 104)
   - is provided (52; 152) with a hub (6) which is formed from an electrically insulating material,
   - is joined in an electrically conductive manner and mechanically strong to an annular disk (54; 154) which is resistant to a reactive environment,
   - is divided (55; 155A) into segment support parts (4; 104),
   - the annular disk is divided (55; 155B) into annular segments (2; 102),
   - the surfaces (14; 114) of the metallic segment support parts (4;104) exposed by the division of the carrier body are coated with a coating which is resistant to the environment,

   characterized in that
   - the coating of the surfaces (14; 114) of the metallic segment support parts (4; 104) exposed by the division of the carrier body takes place by currentless deposition, and
   - the currentless deposition is carried out from a solution or suspension.

2. The process as claimed in Claim 1, wherein the annular disk (54; 154) contains carbon.

3. The process as claimed in one of Claims 1 to 2, wherein the carrier body is divided into segment support parts (4; 104) after joining to the annular disk (54; 154), especially wherein the dividing of the annular disk (54; 154) and the dividing of the carrier body take place in one step, preferably by abrasive cutting or sawing of the combination consisting of the carrier body and the annular disk (54; 154).

Sub B1

4. The process as claimed in one of Claims 1 to 3, wherein coating takes place selectively only on the surfaces (14; 114) of the segment support parts (4; 104).

5. The process as claimed in one of Claims 1 to 4, wherein coating takes place with tin, silver or chromium.

6. The process as claimed in one of Claims 1 to 5, wherein the layer thickness is between 0.1 and 10 μm.

7. A commutator (1) with a metallic carrier body which forms segment support parts (4; 104), which is provided with a hub (6) which is formed from an electrically insulating material, and is joined in an electrically conductive manner and mechanically strong to an annular disk (54; 154) which is resistant to a reactive environment, with the carrier body being divided in segment support parts (4; 104) and the annular disk (54; 154) being divided in annular segments (2; 102), and the surfaces (14; 114) of the metallic segment support parts (4; 104) exposed by the division of the carrier body being coated with a coating which is resistant to the

AMENDED SHEET